June 29, 2000

Documents Management System
U.S. Department of Transportation
400 Seventh Street, SW
Washington, DC 20590-0001

Docket Number RSPA-99-6283

Gentlemen:

With reference to your Docket Number RSPA-99-6283, enclosed are the comments of the U.S. Department of Energy.

We generally support the harmonization of the Hazardous Materials Regulations with the International Atomic Energy Agency *Regulations for the Safe Transport of Radioactive Material*, ST-1. In some areas, while not compromising safety, we believe that domestic exceptions are essential in order to avoid excessive and unnecessary costs on domestic shipments. The enclosed comments highlight those areas where we believe these exceptions are necessary.

We believe the initial implementation date should be as soon as practicable; however, we strongly urge the Department of Transportation to provide for a five-year transition period to full implementation. This transition period will allow sufficient time to make the necessary changes and updates to training, packaging documentation, and operating procedures and develop and procure replacement packagings, as needed.

Thank you for the opportunity to review this advance notice of proposed rulemaking and provide comments. If you have any questions concerning our comments, please contact Mr. Larry Blalock at 301-903-7273 (Larry.Blalock@em.doe.gov) or Mr. Michael Wangler at 301- 903-5078 (Michael.Wangler@em.doe.gov).

Sincerely,

/Original Signed/

Randal S. Scott
Director
Office of Safety, Health and Security
Office of Environmental Management

/Original Signed/

David G. Huizenga
Deputy Assistant Secretary
for Integration and Disposition
Office of Environmental Management

cc: w/enclosure
L. Lee, DP-22
E. Ott, GC-53

J. Bozik, NN-62
J. Carlson, RW-44

US Department of Energy
Comments concerning Department of Transportation
Advance Notice of Proposed Rulemaking (HM-230)
Hazardous Materials Regulations; Compatibility with the Regulations of the International Atomic Energy Agency

Area 1. Scope

Comment 1.1 -
The Department of Energy believes there is no significant safety or economic impact from the application of the graded approach to performance standards as incorporated in ST-1. The Department supports the incorporation of the three general severity levels (routine, normal and accident conditions of transport) into the Hazardous Materials Regulations (HMR).

Area 2. Nuclide-Specific Thresholds

Comment 2.1 - Table of A1 and A2 Values for radionuclides
The entry in 49CFR 173.435 of the Hazardous Materials Regulations for Uranium enriched more than 5 % provides a convenient method to identify highly enriched uranium (enriched from 5 to 100 %) on shipping documentation. If this entry is eliminated, the shipper will have to calculate A-values for each material by its specific radionuclide mix. The benefit derived from requiring this additional characterization versus having the entry already available in the DOT Table is not clear. Consequently, it is proposed that if the DOT regulations are harmonized with the ST-1 Table I, an entry for Uranium enriched above 20% should be added.

ST-1 Table I does not include some radionuclides which are present in the current DOT table (173.435). It is proposed that the entries for Ar-42, Au-196, Es-253 to 255, Ir-193m, Nb-96, Po-208 and 209, Re-183 and Te-118 be retained.

DOE is willing to assist DOT in developing appropriate Q-system parameters and performing the necessary calculations to determine numerical values for these radionuclides.

Comment 2.2 - Radionuclide-specific exemption values
ST-1 includes radionuclide-specific exemption values (Section IV, Table I Basic Radionuclide Values). Current United States regulations in 49 CFR 173.403 and 10 CFR 71.10 define radioactive material as any material having a specific activity greater than 70 Bq/g.

The areas in which DOE may be adversely affected include sample shipments, mixed waste, remelted metals, and environmental restoration activities. Based on preliminary information, a switch from the present fixed exemption concentration (70 Bq/g) approach to radionuclide-specific exemption values

(even with the addition of the exempt activity consignment approach), would incur increased characterization costs, increased paperwork, and increased packaging processing time. To accurately assess the cost implications for the proposed regulatory changes, an accurate estimate of the shipment volumes is needed. Since these estimates were unavailable at this time, a detailed cost/benefit analysis is not possible, but the costs are expected to be very significant.

There is a potential for regulating certain products that are exempt under 49 CFR regulations. Notably among these materials are mining, oil, and gas products, and certain manufactured products. Specific examples of such products that contain various radionuclides, such as Ra-228, Th-228, Am-241, etc., are rare earth minerals, oils and gas extraction by-products, thoriated electrodes, thoriated luminous items, and smoke detectors.

While exemptions from the requirements of packaging, shipping documents, marking, labeling, and placarding could be sought by the shipper for specific products in accordance with provisions in 10 CFR 107.105, the exemption process may be lengthy, extensive, and burdensome on the affected industries. More importantly, the increased levels of complexity to comply with the proposed changes to the U.S. transport regulations due to the implementation of ST-1 by the DOT may impact operations of the affected industries.

Shipping personnel will need training and will need to develop methodologies for making the determinations. The determination will not be simple, as there are two parts. One part is based on the activity concentration of the material and the second part is based on the total activity in a consignment. It is important to note this is a consignment limit and not a package limit. As both parts vary for each isotope, it will require a sum of the fractions determination for both parts for the isotopes present in a mixture. To be considered nonradioactive for shipment one of the parts must be less than or equal to the established limits. These additional complications will add considerable costs to the classification of very low level material for transportation purposes.

If DOT believes that radionuclide-specific exemption values must be adopted for harmony with the international transportation regulations, DOE proposes that a domestic exception be made for low level materials. The exception could continue to exclude materials with activity concentrations below 70 Bq/g from compliance with the regulations, provided that they are only transported domestically.

Comment 2.3 - Revised A-values

There are a number of radionuclides with increases in their A_2 limits in ST-1 Table I when compared with the 49 CFR 173.435. There are 110 nuclides out of 399 (~32%) with no change in the A_2 limits. However, there are 44% of the radionuclides with ST-1 A_2 values greater than the current DOT A_2 values and only 17% with less. Notably among these changes are the fissile material actinides, which are five times higher than the current values.

To determine quantitatively the impact of the new A_2 adjustments on DOE complex, the waste profiles

from the Mount Plant, Rocky Flats Environmental Technology Site, and Sandia National Laboratories (SNL) were examined. The waste profiles from the three sites contain approximately 50% of the radionuclides listed in the Nevada Test Site Waste Acceptance Criteria (NTSWAC). The radionuclides are listed below.

Am-241, Am-243, Bi-207, Cd-109, Cm-242, Cm-243, Cm-244, Cm-248, Co-56, Co-57, Co-60, Cs-134, Cs-137, H-3, Kr-85, Mn-54, Na-22, Np-237, Pa-231, Pb-210, Pm-147, Po-210, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Ra-226, Ra-228, Sb-125, Sr-90, Th-228, Th-229, Th-230, Th-232, U-232, U-233, U-234, U-235, U-238, and Zn-65.

Among the A_2 values for the 41 above nuclides (both ST-1 and 49 CFR 173), eleven nuclides have no change and 28 radionuclides have ST-1 A_2 values higher than 49 CFR 173. Only two nuclides (Ra-226 and Ra-228) have a DOT A_2 value higher than ST-1. This example shows that the new adjusted A_2 values could increase the quantity of Class 7 (radioactive) materials in each Type A, IP-2, or IP-3 packaging. This would increase the quantity of LSA and SCO in any single conveyance.

Other limits on shipments of Type A packages were examined. The maximum conveyance activity limit for LSA-II, –III and SCO materials is 100 A_2 for both IAEA ST-1 and 49 CFR 173 (Table 9). Since 44% of the radionuclides increase their A_2 limits, the DOE complex will be able to ship more volume of waste per conveyance.

In the next 10 years, the Department of Energy will be moving large quantities of radioactive waste (especially LSA and SCO) as a result of environmental cleanup, sites (or facilities) closure, and waste repository operations. Adopting the new A_2 values will increase the waste shipping volume per conveyance. As a result, the transportation costs would certainly decrease and the number of packagings (Type A and IP/STC) required would be reduced.

The Department proposes that DOT adopt the new A_2 activity limits.

Comment 2.4 - The A-values for Californium-252
While many of the radionuclide A-values are higher in ST-1, some are lowered. In some cases this will have a significant direct effect on program shipping activities. In particular, the A_1 value for Californium-252 (Cf-252) has been reduced by half, from 0.1 to 0.05 Tbq. This directly affects the ability of the Oak Ridge National Laboratory (ORNL) to make certain shipments for our Office of Isotopes for Medicine and Science (NE-70). ORNL has often shipped Cf-252 in quantities between 0.05 and 0.1 TBq in Type A packages. These will now be required to be shipped in Type B packages. This adds to the cost and complexity of shipping, and with a limited number of Type B containers, may affect the ability of the laboratory to make shipments on a timely basis which would adversely effect our research and commercial customers.

Lowering the A_1 limit would dramatically increase the number of Type A and/or Type B shipments. In

both cases container handling and transportation costs would be increased significantly. An increased number of Type B shipments would also necessitate the adding of more Type B shipping packages. Some of our customers cannot handle Type B packages, therefore they will either have to make twice as many Type A shipments or cut down on the amount of material they use. Building additional Type B packages would be expensive (considering that one currently under design is costing in excess of three million dollars).

The availability of only one Type B shipping container for californium-252 in Special Form could also be a major problem for the Sales/Loan program if the lesser A_1 values would enter into effect. There would be a potential for significant delays in supplying multiple customer orders.

Many Type A shipments in the 2.5- to 5-mg range have been made without incident over the years. The safety record for transporting Type A amounts of Cf-252 at the higher milligram amounts is excellent. However, it stands to reason that increasing the number of shipments necessary to meet the current demand for Cf-252 would also increase the safety risks related to the industrial and radioactive hazards associated with shipment preparation, container handling, and on-road transport.

For these reasons, DOE proposes that DOT not adopt the ST-1 IAEA A_1 limit for Californium-252 but keep it at its present value. If the A1 limit cannot be changed, then at a minimum, we would propose that there be a domestic exception in the regulations that retain the current A_1 value, thus providing some relief for our domestic customers.

Comment 2.5 - Unknown nuclide values
ST-1 has altered the values for unknown nuclides (Section IV, Table II). At first glance the A_1 values appear to be mixed up. An explanation would be helpful. DOE proposes that DOT provide information either in the preamble or in a guidance document that explains the derivation or presentation of the new values.

Area 3. Communication Changes

Comment 3.1 - Proper Shipping Names
Harmonization of the HMR with ST-1 increases the number of proper shipping names (PSN) for radioactive materials from 6 to 25, including eliminating the most widely used PSN, "Radioactive Material, Fissile, N.O.S. (UN 2918)," and dividing it into 7 fissile types with corresponding PSNs, UN identification numbers and marking requirements. This profusion of numbers does have a marginal benefit of providing some more material specific information for emergency responders; however, it has a significant operational and cost impact in terms of replacing the welded-on labels of the existing fleet of DOE packagings. In order to provide for a more cost effective approach to compliance with the new PSNs, DOE recommends a five-year transition/implementation period (see transition/implementation comments under Area 7).

Comment 3.2 - Placarding
Implementation of ST-1, Section V, paragraph 570 establishes new placarding requirements. This will require placards be placed on three sides of *any* road vehicle transporting packages that display *any* kind of radioactive label or carrying consignments under exclusive use. As a result of this requirement, vehicles transporting packages containing smaller quantities radioactive material packages must be placarded with the Radioactive Placard. There is a concern that the new requirement will induce many commercial carriers to refuse to carry any radioactive material that must be labeled. This would include all Type A packages. The fact of having to display the placard may also be significant, as some carriers may refuse to carry materials that require that their vehicles be placarded. As an example, the van that carries a radioisotope generator to a hospital may also deliver mail-order food or clothing to a household down the street. The sight of a "radioactive" placard on such a van may be considered unacceptable by the carrier.

While placarding has an important purpose, imposing the use of the Radioactive Placard when a small package is shipped is not warranted. The main concern is that carriers will become intimidated by this placarding requirement. As a result, carriers potentially could refuse to transport small quantity packages of radioactive material or raise the cost to handle such shipments. The DOE proposes the existing placarding requirements of the HMR be retained.

Comment 3.3 - Radionuclide mixtures
ST-1, Section V, paragraph 543 (a) requires where there is a mixture of radionuclides, the most restrictive nuclides be listed first. It seems reasonable (and is endorsed in the draft ST-2 advisory material) that those radionuclides exhibiting the highest ratio of concentration divided by their respective A-value should be listed in descending order. Revising the required A_2 calculation to include only those radionuclides that contribute the first 95 percent of the total activity would not compromise safety and would simplify the calculation for determining which radionuclides must be listed on the labels and shipping papers while promoting consistency among the two. The DOE proposes that the present HMR rules on mixtures be retained.

Comment 3.4 - Labeling
ST-1, Section V, paragraphs 541, 544, and 545 add new package labeling requirements for criticality safety. The purpose this new rule is to provide information on CSI and to identify package as a fissile package. Similar to the category labels which provide information on the Transport Index (TI) and the contents based on maximum radiation dose rate at one meter from the package, the CSI provides essential information relevant for proper separation of packages with fissile material contents during the storage and stowage. The one-time Departmental operational impact and cost of incorporating and complying with criticality safety package labeling requirements is anticipated to be a few million dollars. This is a one-time cost to comply with the requirement, if implemented. Impacts include new hazardous materials personnel training, hazardous materials procedure changes, and package, overpack and container labeling (see also comment 9.1). Changes to the communication regulations will require new labels and a five-year transition time will be sufficient to use existing label inventories and develop,

manufacture, and obtain new labels prior to the implementation date. The DOE supports incorporation of the criticality safety package labeling requirements for fissile packages.

Area 4. Uranium Hexafluoride

Comment 4.1 - American National Standards Institute N14.1
Harmonization of the HMR with ST-1 would require compliance with International Standards Organization standard 7195 (ISO 7195). The Department proposes that the current HMR reference to ANSI N14.1 be continued.

Comment 4.2 - Cylinders of depleted Uranium Hexafluoride
Large quantities of depleted UF_6 (about 60,000 Type 48G packages with UF_6 tailings) are presently in storage in the U.S. The Department issued the *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (Final PEIS)* on April 23, 1999. DOE considered the environmental impacts, benefits, costs, and institutional and programmatic needs associated with the management and use of its approximately 700,000 metric tons of depleted uranium hexafluoride. In the *Record of Decision (ROD) for the Long-Term Management and Use of Depleted Uranium Hexafluoride*, DOE has decided to convert the depleted UF_6 inventory to depleted uranium oxide. The depleted uranium oxide will be used as much as possible and the remaining depleted uranium oxide will be stored for potential future uses or disposal, as necessary. DOE anticipates that approximately 4,700 cylinders of depleted UF_6 that are located in Oak Ridge, Tennessee, would be transported to the conversion facility. If the ST-1 requirements are incorporated into the HMR for the depleted uranium hexafluoride cylinders, costs for overpacking and transporting these cylinders would increase substantially without additional safety benefit. The DOE proposes that the depleted UF_6 material (less than 1% uranium-235) should continue to be treated as the toxic, corrosive chemical that it is, rather than as a radioactive material and the current HMR requirements for cylinders of depleted UF6 be continued.

Area 5. Low Specific Activity (LSA) materials and Surface Contaminated Objects (SCO)

Comment 5.1 - Definition of LSA-1
Although neither ST-1 nor Safety Series No. 6, 1986 Edition (As Amended 1990) include mill tailings, contaminated earth, concrete, rubble, other debris, and activated material in which the Class 7 (radioactive material) is essentially uniformly distributed and the average specific activity does not exceed 10^{-6} A_2/g in their definitions for LSA-1, DOE supports that The Hazardous Materials Regulations continue to include these materials in the definition for LSA-1.

The difference between the current DOT regulation and the ST-1 requirement can be significant. For many DOE low level waste (LLW) shipments, the activity is essentially uniformly distributed and the

average specific activity is below 10-6 A_2/g, which result in the shipments meeting the LSA-I classification. By adding the requirement that each nuclide in the package not exceed 30 times the value given in ST-1 Table I, a shipment could be reclassified into the higher LSA-II category, due to the presence of just one isotope exceeding this limit. LSA-II material require a more costly IP-2 package for transportation.

Comment 5.2 - Strong, tight containers
The Hazardous Materials Regulations currently permit the use of strong, tight containers (STCs) for domestic transport of LSA-1 materials. ST-1 strictly incorporates the use of the industrial package. The use of STCs needs to be continued in the HMR. If a decison is made to phase out the use of STCs, the use of industrial packagings should be phased in over a period of time (at least 5 years) by permitting the continued use of strong, tight containers.

The immediate requirement for the use of industrial packagings may cause an insufficiency of available compliant containers and potential significant repackaging of package LSA-1 material. An appropriate transition period would allow the DOE to continue its LLW operations within its schedules. DOE proposes that DOT maintain the current STCs in the HMR.

Comment 5.3 - Placarding
ST-1 and Safety Series No. 6, 1986 Edition (As Amended 1990) contain essentially the same placarding requirements. In the regulations that were promulgated under HM-169A, RSPA chose not to incorporate these placarding requirements. Since there is no apparent added safety in the change in placarding requirements, DOE proposes that DOT maintain the current placarding requirements in the Hazardous Materials Regulations.

Comment 5.4 - Use of ISO packagings for industrial packagings
The DOE supports the use of alternative requirements for Industrial Packages Types 2 and 3 and proposes that the DOT incorporate them into the revision of the hazardous materials regulations.

Area 6. Type B/fissile packagings

Comment 6.1 - Fissile excepted
When compared to Safety Series No. 6, 1986 Editiona (As Amended 1990) ST-1 adds a requirement for fissile-excepted materials that limits beryllium and deuterium to 0.1% of the total fissile mass. The NRC has already incorporated this requirement into the 10 Part 71 under an emergency rulemaking. The DOE commented at the time that this requirement added little to safety and could cause the need for additional testing of previously identified fissile-excepted materials. We reiterate our concerns. This change would require each DOE Site to determine the beryllium content of every low level and some TRU waste drums. Some of this information may be available, but would require the application of another “filter” to the waste characterization process. Inevitably some significant population of site waste would be subject to additional sampling and analysis processes. The administrative costs and potential

schedule delay associated with documenting this requirement makes it unreasonable for the benefit received. This is not a safety issue for low level waste and should not be required for waste materials shipped under the LSA/SCO exception, in particular.

Comment 6.2 - Double containment requirements
The ST-1 Package Containment System design requirements are the same for all radionuclides while 49 CFR 173.413 and 10 CFR part 71.63 impose special requirements for plutonium shipments to be met by the designer of the package in seeking approval of the package from the U.S. competent authority. IAEA and national regulations of other member countries generally do not make a special case for plutonium.

Furthermore, we believe that the current regulations in 10 CFR 71are internally inconsistent regarding the adequacy of a plutonium packaging. Based on the "Q-System for the Calculation of A_1 and A_2 values," which is embraced by IAEA and NRC regulations, a Type B package is sufficient for all radionuclides whose quantity exceeds A_2. The additional regulatory requirement of a separate inner container for packages containing plutonium is not congruent with the requirements for all other radionuclides.

Since the advent of the Q-System in the RAM transport regulations in the mid 70's, there has been no remaining justification for the double containment requirement for plutonium. The Q-System provides a consistent method for setting the quantity of a radionuclide that is considered to provide the potential for exceeding a dose limit by the most limiting dose pathway. This was not always the case. In the previous hazard categorization scheme nuclides were considered in classes, but not every nuclide in a class was of an equal hazard. This situation lead to special treatment of some nuclides/physical forms that were considered particularly hazardous. Since NRC has adopted the Q-System methodology as part of an effort to harmonize with the international regulatory system, the special treatment for plutonium in 10CFR71.63 is internally inconsistent with the changes that NRC has already made.

Moreover, the Department believes that, if the special requirements are eliminated, personnel exposures from routine handing will decrease through reduced process time and those costs will be reduced substantially through more efficient handling and packaging. International harmonization of regulations is another benefit of the proposed change.

As a result these Pu-specific requirements impact DOE operations and those of other agencies and the nuclear industry. These requirements limit process flexibility while adding to the complexity of packaging designs and, thus, to worker exposure due to extra handling, cost of packaging design, manufacture, operation and maintenance. The requirements are no longer necessary.

Comment 6.3 - Criticality safety confinement system
ST-1 introduces the concept of confinement system for fissile materials which current US regulations, 10 CFR 71 and 49CFR173, do not have. The confinement system is the assembly of fissile material and

packaging components specified by the designer and agreed to by the competent authority as intended to preserve criticality safety. The confinement system includes that part of a package necessary to maintain the fissile material in the configuration that was assumed in the criticality safety assessment for an individual package.

The DOE has no objection to the incorporation of this concept. Incorporation would have the benefit of assisting a package design reviewer by requiring the application to specify the confinement system. After agreeing the this specification is appropriate, the reviewer will be able to confirm more readily the criticality safety assessment submitted by the applicant.

Comment 6.4 - Exclusion of Pu-238 from definition of fissile material
DOE supports the removal of Pu-238 from the definition of fissile material. This action will increase very slightly the amount of weapons grade Pu that could be placed in a package before fissile loading/packaging requirements would be invoked.

Comment 6.5 - ST-1 requires a measurement to be performed after irradiation but prior to shipment to confirm isotopic composition if the most reactive time in life is not used in evaluations of the package design. The measurement is required to verify the irradiation and decay characteristics of each irradiated component to be loaded in the package.

ST-1 does not specify what constitutes an acceptable measurement method, which could be interpreted to require a chemical analysis. A chemical analysis is clearly undesirable and in many cases is completely impractical. Alternate justification other than direct measurement should be permitted.

Area 7. Other Changes

Comment 7.1 - Radiation protection programs and related training
ST-1 paragraphs 301 - 306 would add new requirements on carriers in the area of radiation protection. There is serious concern that these additional requirements may reduce the set of carriers willing to handle radioactive shipments, particularly carriers that handle less than truckload (LTL) shipments or packages containing small quantities of radioactive material. Those carriers who continue to transport packagings will need to increase fees to cover the costs of conducting their programs. Costs for such requirements will be passed on to customers by the carriers at an estimated increase of 25% in freight charges. This would be despite the very low risks associated with these types of shipments which Environmental Impact Statements done for/by DOE have consistently demonstrated.

Paragraph 106 requirements include “preparation”. If these requirements were adopted, paragraphs 301-307 might then apply the new transport safety radiation protection program requirements to these traditional facility functions. Additionally, paragraph 301 does not identify who is responsible for establishing and implementing such a radiation protection program. In the US, this lack of specificity would likely result in significant duplication of efforts and ambiguity in potential enforcement actions.

The existing DOT regulations already have a clear and effective set of training requirements. In paragraphs 302 and 303, ST-1 requires radiation protection programs and additional training. The very general wording of these requirements could end up being interpreted as requiring a complex and restrictive set of procedures that carriers will need to comply with. These additional requirements do not seem to be warranted.

For these reasons, the DOE proposes that DOT not adopt these new transport safety radiation protection program requirements.

Comment 7.2 - Specification packages and strong tight containers
ST-1 does not allow specification packages (such as 6Ms) and STC as currently allowed under the HMR (49 CFR 173.416, and 417) and (49 CFR 173.427(b)(3)).

Specification packages and STCs are being widely used without any problem throughout the DOE complex for transportation and storage of radioactive materials. Currently, the Department has a total of 8,100 6M packages in storage and approximately 7,000 of them qualified for transport. The use of specification packages needs to be continued in the HMR. If a decision is made to phase out the use of specification packages, a transition period of at least 5 years is requested. The discontinuance of the use of these packagings without a transition period will have a serious impact (especially cost) on DOE. The DOE is already in the process of replacing 6Ms with fully certified packagings and will need the transition period to obtain a sufficient number of certified packagings to meet programmatic needs.

Comment 7.3 - Type C Package for Air Transport
The IAEA regulations have requirements for air transport of dispersible radioactive materials in excess of 3000 A_1 or A_2. Low dispersible (LDM) radioactive materials are not subject to Type C air transport requirements and may be shipped in Type B containers.

In the U.S., the Nuclear Regulatory Commission (NRC) has special requirements for air shipments of plutonium (10 CFR 71.64 Special requirements for plutonium air shipments and 10 CFR 71.74 Accident conditions for air transport of plutonium.). The NRC does not have special requirements for air shipment of other radioactive materials. The US regulations for Pu air transport were developed in direct response to a specific statutory mandate. The actions focused only on plutonium materials and not other radioactive materials.

The international regulations deal with both Pu and other materials. The concept of the Type C package is that it is capable of withstanding severe accident conditions in air transport without loss of containment or increase in external radiation level to an extent that would endanger the general public or those involved with rescue or cleanup operations. The package could be safely recovered, but it would not necessarily be capable of being reused.

The Type C package provides similar levels of protection between the surface and air modes when compared to a Type B(U) or Type B(M) package in a severe road or rail accident. To achieve this goal, it is necessary to ensure that the same external radiation level and loss of content limits are required following the Type B accident condition tests and the Type C tests.

ST-1 includes a major new addition to the regulations that comes to grips with the disquiet that was felt in the international regulatory arena concerning transport of large quantities of Pu by air. The effort to develop such regulations went on for more than six years and included multiple consultant, technical, and writing committee meetings. The final result has several important features:

1. A Type C package must be used for shipments by air of more than 3000 A_1 or A_2 of dispersible materials (this recognizes that other materials, besides Pu, may present significant hazard in a severe air accident).
2. Materials that are not easily dispersible (LDM) are excepted.

The qualification tests for the Type C require meeting the Type B tests as well as an enhanced impact test (90 m/s) and an enhanced puncture test followed by a 1 hour engulfing fire.
It is clear that the Type C qualification tests are somewhat less severe than the current U.S. plutonium air package requirements. However, the actual level of protection attained by the IAEA test is quite close to that attained by the U.S. requirement because the impact speed and fire duration incidence curves are approaching flat at these levels.

There is a cost impact to the United States if the IAEA Type C requirements are adopted because packages will have to be designed and certified for air transport of more than 3000 A_1 or A_2 of dispersible materials. On the other hand, LDM may be shipped by air in Type B packages.

The Department supports harmonization with the IAEA air transport regulations and incorporation of Type C requirements for dispersible materials. The Type C requirements recognize that other materials may pose significant hazards in a severe air accident.

The Department suggests reevaluation of the existing regulations for plutonium in light of the level of protection afforded by the IAEA ST-1 Type C regulations. Incorporation of the Type C package air transport requirements into the U.S. regulations will result in harmonization with IAEA regulations and will also enable NRC to certify air transport packages that could be used outside U.S. airspace. In any event, it would be helpful to clarify the relationship between Type C package requirements and any domestic requirements which are different.

Comment 7.4 - Marking of package mass
DOT is generally clear about whether they permit non-SI units to be used to fulfill a requirement. Although there is no change to the requirement for the marking of the mass of a package, it is an opportunity for DOT to clarify this aspect of the regulations. DOE encourages that the text clearly indicate an allowance to use either pounds or kilograms to meet the requirement.

Comment 7.5 - Quality Assurance
Paragraph 310 would impose the establishment of a formal QA program based on national and international standards for all packages. It appears to impose formal design, design specifications, and quality assurance requirements on even Excepted Packagings.

Most national and international QA standards allow for a graded approach based on risk or hazards analysis. Therefore excepted packagings, industrial packagings and Type A packagings would have appropriate (rather than highly detailed) QA applied since the hazards and risks associated with these shipments would be minimal. Applying overly restrictive QA elements down into excepted packaging, industrial packaging and Type A packaging would be expensive and would not significantly improve package performance or safety.

If DOT believes that QA programs are needed, it encourages DOT to be very specific in providing guidance or regulatory text that clearly communicates the application of a graded approach to these requirements.

Comment 7.6.a. - Contamination
Radioactive material is presently defined as material which is greater than 70 Bq/g. Contaminated articles cannot be defined under the old definition and guidance was provided in NUREG 1608 (1998) based on ST-1. Contaminated articles are specifically regulated depending upon radionuclide and levels of total contamination (fixed plus removable) when averaged over 300 cm^2 on an object.

The ST-1 definition of non-fixed contamination relates to whether contamination may be removed during conditions of routine transportation. The present definition is what can be removed by wiping and shippers typically use a 10% wipe efficiency factor in contamination measurement procedures. DOE encourages the adoption of the ST-1 definition of contamination with clarification of the meaning of "...can be removed from a surface during routine conditions of transport".

The detailed contamination limits in ST-1 paragraph 508 deal with non-fixed contamination and are clear. Paragraph 214 appears to be for total contamination as opposed to only non-fixed contamination. Clarification of this during the rulemaking action is encouraged.

Comment 7.6.b. - Contamination
ST-1 indicates that surface contaminated items are not regulated as Class 7 material if the surface contamination limits (fixed plus removable) are below 0.4 Bq/cm^2 (22 dpm/cm^2) for beta-gamma and low toxicity alpha emitters and 0.04 Bq/cm^2 (2.2 dpm/cm^2) for all other alpha emitters. These values are inconsistent with "release" values currently used by NRC and DOE for releasing material to the public without further regulation. Incorporating the ST-1 definition of contamination is needed and would be helpful, as the current regulatory limit of 70 Bq/g cannot be applied to surface contaminated objects. The release limits established by NRC and DOE for said items do not correlate with the levels in ST-1. The differences include not only the allowable contamination, but also how the nuclides are

grouped (enriched U is high toxicity alpha under DOT, but is low toxicity alpha under DOE), and also whether the regulatory limit is to be compared to the activity found on the "wipe" or on the surface of the item. The Department proposes that the contamination definition in ST-1 be adopted. However, we feel some clarification and coordination needs to occur between DOT, DOE, and NRC regarding the "release" limits for surface contaminated objects.

Comment 7.7 - Implementation period
The costs associated with working with one set of regulations for air and water and another set for highway and rail shipments may be more than the costs associated with complying with one standard. The databases and software presently used to support packaging and transport activities would have to be modified to run calculations for both sets of regulations and this is more onerous than just changing it to calculate for the compliance with ST-1. Because of this, the Department proposes that DOT harmonize the HMR with ST-1 as soon as possible; however, DOT should provide a five-year transition period for full implementation.

Comment 7.8 - Training and retraining of hazardous materials employees and updating documents
Harmonizing ST-I into the DOT federal regulations could result in significant costs (economic and personnel) to the Department for training and retraining hazardous materials employees and converting and updating packaging and other procedural documents for regulatory compliance. Operating procedures, design guidance documents, SARPs and SARP review procedures, limits calculations (lung absorption, etc.), proper shipping names, markings, etc. would have to be revised and approved to adhere to specifics outlined in ST-1. Procedures would have to be developed to provide specific guidance (in association with present guidance) concerning applicable mandates. This is a very costly impact without any beneficial improvement in safety. HAZMAT Training resources (course materials, learning-measurement devices and delivery methods) will have to be changed to reflect the new regulatory requirements and methodologies. Refresher training and initial training in the new requirements will have to be initiated in a timely manner which will have an initial cost in excess of $3M for the Department. The Department proposes the DOT adopt an early harmonization date for ST-1 and the HMR, but provide a five-year transition period to allow sufficient time for changes to be incorporated in an orderly and economical manner.

Comment 7.9 - Import and Export
The January 1, 2001, adoption and implementation of the ST-1 requirements by ICAO/IATA, UN and IMO will result in the potential for application of two different tables of radionuclides for shipments. For a single of multi-modal shipment, a material could be determined to be radioactive under one set of requirements and not regulated under the other. These differences can be expected to reveal problems in when determining what packaging to use, labels and placards to apply, etc. The Department proposes that the provisions of 49 CFR 171.11 and 171.12 be continued during the period of transition to ST1 and HMR harmonization and implementation thus providing for uninterrupted international commerce.

Comment 7.11 - Packaging "grandfathering"

ST-1, Section VIII, TRANSITIONAL ARRANGEMENTS, provides for "grandfathering" packages prepared for transport prior to various dates, depending on the edition of the IAEA regulations utilized. The Department is in the process of procuring packagings based on design approvals under the current DOT/NRC regulations. Also, the Department has a considerable inventory of radioactive material stored in previously authorized transport packagings, for which future use may require transport after the aforementioned ST-1 dates, and thus require re-packaging if a "grandfather" relief is not provided. The Department proposes that DOT incorporate the following: "Packages that have been prepared for transport prior to (five-year effective date) may be offered for transport provided that the labeling, marking, and placarding provisions of the regulations in effect at time of shipment are complied with."

Comment 7.12 - Cost of Harmonization Versus Benefits

The existing domestic regulations governing radioactive material shipments have resulted in safe and effective protection of the public, and no known situations have resulted in adverse radiological impacts from such shipments. The existing regulations have been simple to implement and any changes to regulations that have been effective to date should be carefully considered in terms of costs versus benefits.

Moreover, under current DOT regulations freight costs for radioactive material tend to be at least 50% higher than non-radioactive material. For materials which are newly defined as radioactive for the purposes of transportation (activity concentrations between 1 and 70 Bq/g which are above the activity limit for an exempt consignment), these transportation costs would certainly increase with the incorporation of ST-1 into our national transportation regulations.